No. 34 • August-September 1990

solplan review

the independent newsletter of energy conservation, building science & construction practice

Inside ....

Windows are the weakest thermal element in the building envelope. Recent improvements in technology and a better way of calculating window performance means that window R-values are substantially different from previously published figures. We review the concerns and provide new R-Value numbers for typical window units. They may surprise you.

Fireplaces are a central decorative feature in many homes, but they also backdraft, create conditions to backdraft other appliances, as well as being a major source of heat loss. But how big are these air flows? We report on recent tests done on prefab fireplaces.

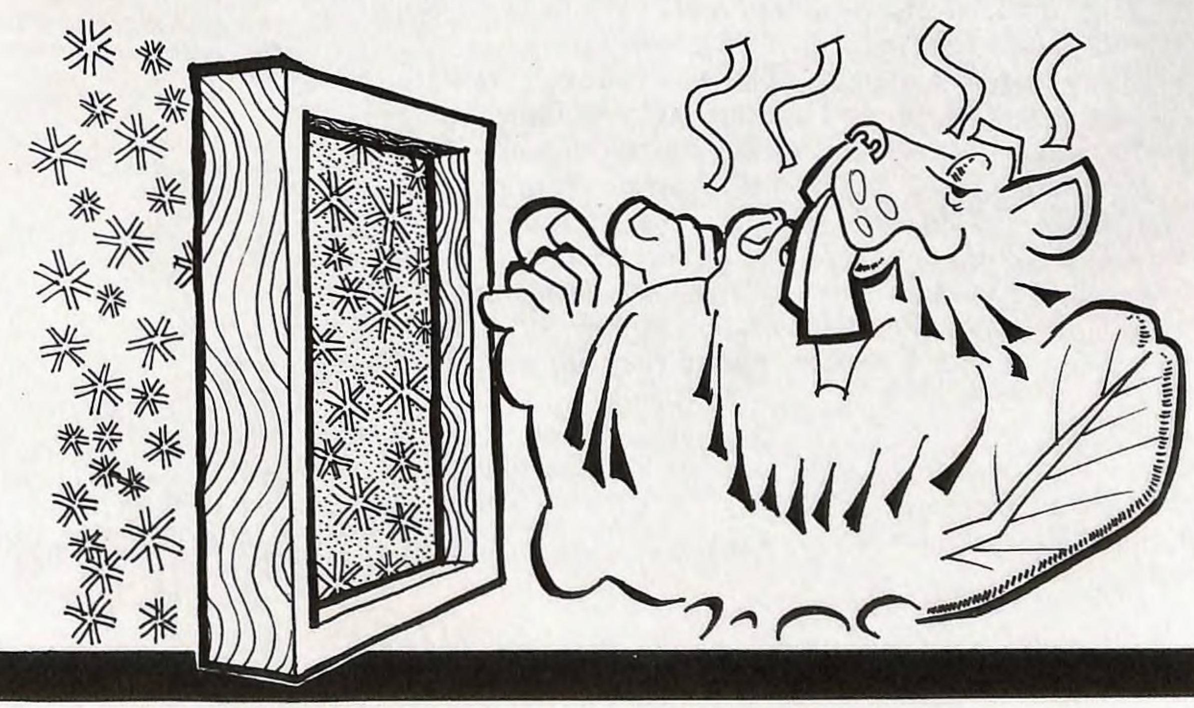
Air sealing is a major feature of energy retrofit programs as uncontrolled leakage can account for over 1/3 of a home's total heat loss. Just what are effective air sealing strategies? We present results of a Connecticut utility's evaluation of alternative approaches to air sealing. It is more complex than one thinks, and requires expertise to do a proper job.

How to comply with the ventilation requirements in the new code is a problem for many builders and regulatory authorities. We review the draft of a How-to manual that is presently being prepared.

Other items include reports on blown-in place wall insulation, energy regulations in B.C. and Ontario, changes at the Saskatchewan Research Council, CHBA-TRC news, and more.

Contents ....

Window Performance



From the Publisher

How does change take place? How should new technology be implemented to benefit society? Should it be done by regulation or should we let the marketplace take care of it?

We generally rely on the power of the marketplace and have mistrust of the regulated option. If something is needed or wanted, the market will see that the new products are available - or so the theory goes. But does it really work that way, especially when the costs to develop and make available new equipment are high?

One example of this process comes to mind. Before B.C. Hydro launched its Power Smart program anyone wanting an energy efficient refrigerator did not have many choices. It was a case of "you can have anything you want as long as we decide to make it".

One part of B.C. Hydro's Power Smart program encourages energy efficient refrigerators (to reduce the utility's base load). It provides cash incentives to consumers and sales people to encourage the purchase of efficient units. Canadian manufacturers screamed they didn't have any products to offer; they were being discriminated upon, etc. Hydro persevered with its program. The result? Within a matter of months the manufacturers were scrambling to meet the demand. At first special B.C. version models were offered. Now most models they make are efficient, and not just for the B.C. market.

This is a case of a voluntary program that used some strong persuasion to effect major change. Without the weight of the utility program, would we have the same number of energy efficient models? Would the product have been modified? My cynical nature tells me it is highly doubtful.

These thoughts come to mind as new regulations are coming into force in Ontario and soon in B.C. regulating energy performance of new construction and appliances.

Many are against regulations. If we don't want to see regulations, changes and improvements must be made. Industry must be responsive to changing public attitudes. This is especially important as we confront new energy and environmental concerns. It's an opportunity for industry to deal with issues of public concern before they are imposed.

Richard Kadulski
Publisher

solplan review

Editor-Publisher: Richard Kadulski
Illustrations: Terry Lyster
Contributors: Anil Parekh, Tim Mayo, Russell K. Johnson

SOLPLAN REVIEW is published 6 times per year by:
the drawing-room graphic services ltd.
Box 86627, North Vancouver, B.C. V7L 4L2
Tel: 604-689-1841 FAX: 604-689-1841

Street address:
205-1930 West Broadway
Vancouver, B.C. V6J 1Z2

COPYRIGHT 1990 by The Drawing-Room Graphic Services Ltd. All rights reserved. Reproduction without written permission of the publisher is strictly forbidden. Transgressors who don't take heed note: we'll send a colony of carpenter ants to have a feeding frenzy at your home.

ISSN: 0828-6574

SUBSCRIPTIONS: $30.00 per year. U.S.A. and other foreign subscriptions payable in U.S. funds or $36.00 Canadian.

CHANGE OF ADDRESS: Please include a mailing label or copy all information off label for faster, accurate processing.

Unsolicited contributions and manuscripts welcome. Include self-addressed prestamped mailer if return requested. Publisher not responsible for loss or damage of same. While every effort is made to provide accurate and complete information, we do not warrant or guarantee the accuracy and completeness of such information.

ADVERTISING POLICY: Publisher's discretion in the acceptance of any advertisement. No endorsement is stated or implied by the publisher.

Printed in Canada
Second Class Mail Registration No. 6855
Postage paid in Vancouver, B.C.

Date of Issue: September 1990

SOLPLAN is a registered trademark of The Drawing-Room Graphic Services Ltd.

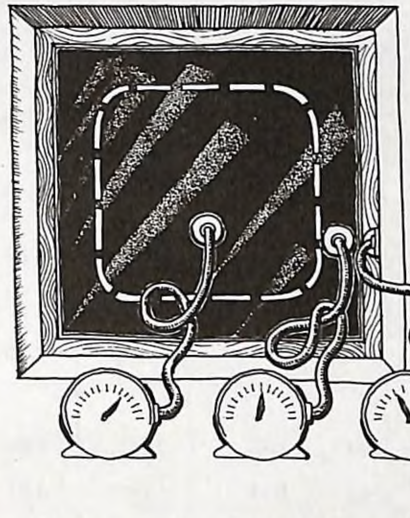
design and consulting
energy efficient building consulting services
R2000 design evaluations
HOT2000 analysis

richard kadulski architect

#205 - 1930 west broadway
vancouver, b.c. v6j 1z2
telephone (604) 689-1841

Window Performance: what are the real R-values?

Richard Kadulski



Every manufacturer presents their products in the best way possible way. Windows are no different. Because of energy conservation concerns, the R-values are of interest.

It now appears that window R-values have been overstated. For years the industry has used ratings developed by a formula established by ASHRAE many years ago. The calculated results are much higher than test results.

In the days of regular single glazing, and even basic double glazing the difference was not serious. With the coming of new technical improvements the difference becomes important.

It has been known for some time that the formula was not accurate as it did not deal correctly with a number of factors that describe the thermal performance of a window. The latest ASHRAE Handbook of Fundamentals has a new revised formula for the calculations. The result is more accuracy but much lower R-values.

Is it important to have accurate window R-values?

An accurate formula is important as the cost of testing window units is high. A good tool that can accurately predict window performance is needed, especially at a time when there are many changes in the technology.

Correct information is also important for predicting how the windows are going to impact on a building. If you put wrong numbers into calculations, you won't get accurate heat loss analysis.

What difference does an error of R-0.5 or R-0.9 make? In conventional houses with lower levels of insulation, standard double-glazed windows account for about 25% of total heat loss. As the insulation levels are increased, windows become the single largest source of heat loss that can account for more than 40% of the total. Thus when upgrading the envelope windows must also be improved.

The new formula

The new formula means that most window units are down graded so that using these new ratings it may not be as easy to meet energy performance targets (e.g. the R-2000 Program, energy codes). This may need a rethinking of the design, such as changes to glass area, upgrading windows or other building components.

The new formula takes into account the R-values at the centre of the glass area, the insulating properties of the frame, the edge effect (including the spacer), wind velocity (15 mph), a temperature difference of 70°F (+70°F inside, 0°F outside), and a standard unit size (3'x4').

An alert notice issued by the Energy Efficient Building Association points out one example: a high performance insulating glass with gas fill has been advertised (using the old formula) as having an R-value of 4.2, but under the new formula the R-value is 3.2 (26% less).

This means that published window literature is largely wrong and will lead to confusion as reputable manufacturers change their literature while aggressive salesmen will overlook the details and push the old literature forward.

Table 1 shows the R-values for the total window, for different types of glazing and spacer in 3 common frame types. An aluminum spacer is the conventional product. Both "hard" low-e coatings with an emissivity of 0.4, and a "soft" low-e coating with an emissivity of 0.09 are shown.

These numbers were calculated with the Window 3.1 computer program developed at the University of California (Berkeley) which is based on the new ASHRE formula.

As one can see from the table, there is a wide range of options possible. You can custom design a window with the properties you need. The major problem is that many window manufacturers are small operations that may not be set up to provide all the options. Larger manufacturers have the technical support staff, but due to production needs they may only offer a limited number of standard options.

Why are accurate window ratings important?

In well insulated energy efficient houses, the windows are the single largest source of heat loss, thus the greatest benefit is achieved by upgrading windows.

Energy-efficient houses are well sealed and thus tend to have higher indoor humidity levels. To reduce condensation on cold glass surfaces, without overly drying the house, the windows have to be at a higher interior surface temperatures. This can be achieved by using the new generation of high-performance glazings.

Heat loss mechanisms

Heat flow through the window is a complex task. When calculating the thermal performance of windows, a number of factors must be considered.

Heat can flow from outside to inside during sunny and warm days. Heat can also leave the building from inside;

TABLE 1. R-VALUES FOR WINDOW UNITS

Glass	Air Space	Gas Fill	S.C.	R.H.	Temp.	R-value WOOD FRAME	R-value ALUMINUM FRAME	R-value ALUMINUM w/break
1. double glass	½"	air	.886	41%	7.4°C	2.05	1.32	1.65
2. double glass, hard coat low-e	½"	air	.848	48%	9.6°C	2.31	1.44	1.85
3. double glass, soft coat low-e	½"	air	.735	57%	12.1°C	2.65	1.6	2.11
4. double glass, hard coat low-e	½"	argon	.851	52%	10.8°C	2.46	1.51	1.96
5. double glass, hard coat low-e butyl/metal spacer	½"	argon	.851	52%	10.8°C	2.57	1.56	2.05
6. double glass, hard coat low-e, butyl/metal spacer	½"	air	.848	48%	9.6°C	2.39	1.48	1.91
7. clear triple glass	½"	air	.793	56%	12°C	2.64	1.59	2.1
8. triple glass 1 low-e (on centre glazing)	½"	air	.758	60%	13.1°C	2.81	1.66	2.22
9. triple glass 1 low-e (on centre glazing)	½"	argon-air	.764	63%	13.7°C	2.91	1.7	2.28
10. triple glass 1 low-e (on centre glazing) butyl/metal spacer	½"	argon-air	.764	63%	13.7°C	3.12	1.78	2.45
11. clear triple glass	3/8"	air	.792	54%	11.4°C	2.55	1.55	2.02
12. triple glass 1 low-e (on centre glazing)	3/8"	air	.755	58%	12.4°C	2.69	1.61	2.14
13. triple glass 1 low-e (on centre glazing)	3/8"	argon-air	.762	60%	13.1°C	2.81	1.66	2.23
14. Heat Mirror 88	3/8"	air	.665	61%	13.3°C	2.84	1.67	2.25
15. Heat Mirror 88	3/8"	argon-air	.671	65%	14.3°C	3.03	1.75	2.39

Spacers: *Except as noted, all assume standard aluminum spacers*
S.C. *shading coefficient: a measure of how much solar gain there is through the window*
R.H. *relative humidity at which condensation starts*
Temp. *Temperature at design conditions on interior surface*
R-value WOOD *wood frame*
R-value ALUMINUM *conventional non-thermally broken frame*
R-value ALUMINUM w/break *thermally broken frame*

how much depends on the thermal resistance of the window components.

The thermal resistance of the window comes from the air space between the panes of glass and from the thin films of air on the inside and outside surfaces of the assembly. The glass itself has little resistance to heat flow. Low emissivity (low-e) coatings applied on glass or plastic reduce the flow of heat radiating from objects and people inside. Gases other than air in the cavity of sealed glazing units increase the R-value.

Surface temperatures on the interior affect the maximum allowable indoor relative humidity and the potential for moisture condensation on the glass. Condensation on the window increases heat loss.

Surface temperatures of a window can be increased by improving the thermal resistance of the window by the use of multiple air spaces, low-e coatings, or the use of low conductivity gases in the spaces between glazings.

Interior temperatures of the frame can be improved by making the frame with low conductivity materials or by using thermal breaks between inside and outside frame surfaces. A frame with a larger exposed area inside than outside will also increase the inside surface temperature.

Indoor comfort in the winter is influenced by the presence of large cold surfaces such as windows. They contribute to discomfort through direct radiant heat flow from the person to

TABLE 2: ENERGY SAVINGS PER WINDOW (per square foot window area)

Energy Cost: $/kWh	TORONTO $0.0599	WINNIPEG $0.0472	EDMONTON $0.0512	HALIFAX $0.0726	ST. JOHNS $0.0706	VANCOUVER $0.0500
Type of glazing	$/ft^2 of window savings	$/ft^2 of window savings	$/ft^2 of window savings	$/ft^2 of window savings	$/ft^2 of window savings	$/ft^2 of window savings
Standard fouble glazing	Base	Base	Base	Base	Base	Base
Double glazed, 1 low-e, air fill	$0.325	$0.366	$0.439	$0.406	$0.435	$0.216
Double glazed, 1 low-e, argon fill	$0.496	$0.557	$0.624	$0.624	$0.673	$0.332
Standard triple glazed	$0.403	$0.454	$0.502	$0.510	$0.551	$0.272
Triple glazing, 2 low-e, air fill	$0.490	$0.554	$0.632	$0.609	$0.655	$0.316
Triple glazing, 2 low-e, argon fill	$0.595	$0.670	$0.769	$0.743	$0.801	$0.388
Triple, Heat Mirror 66, 10mm air space	$0.389	$0.438	$0.499	$0.487	$0.523	$0.256

Energy cost is the average provincial electrical rate. If a lower cost heating fuel is used, these figures should be adjusted by the difference.

These figures can be used to give an indication of the energy savings due to each window type, for the given energy costs. Multiply the window area by the energy savings to determine the net benefit of a given window option. By comparing alternate window costs, you can determine viable alternatives for your situation.

the surface and by cold drafts flowing off the surface. In most cases the heating system is expected to overcome these uncomfortable conditions.

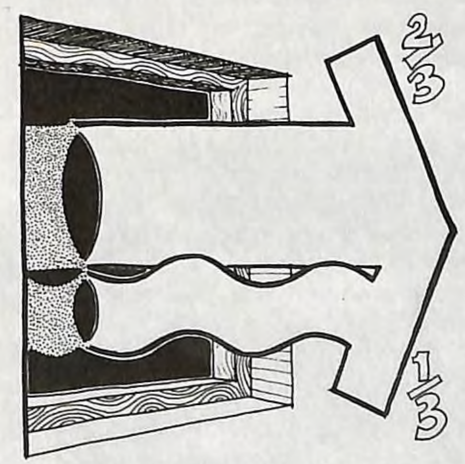
Increased thermal resistance of high performance glazings also results in higher inner glazing temperatures. This improves comfort by reducing radiant heat loss and reducing convective drafts.

The higher the glass R-value (and thus the higher the inner temperature) the higher the indoor relative humidity that can be maintained without causing condensation.

Heat Loss

In conventional double-glazed windows radiation accounts for about 65% of the total losses while convection and conduction between glazings account for about 35%. A low-e coating on the glass can reduce the radiation losses to less than 20% of net losses so conductive and convective losses become dominant. These losses can be reduced by using an inert gas (typically argon) instead of air between the glazings.

Conduction losses at the edge can be reduced by using insulating spacers and frames.



Why upgrade windows?

Significant energy savings can be had by using higher performance windows. How big are the potential savings?

EMR did some calculations for 6 Canadian locations. For comparison purposes a "typical" 2185 sq. ft. two storey plus basement house was used for the energy analysis (walls R-30, ceiling R-40), with a total glass area of 344 sq. ft. equally distributed on all sides. The assumed window type was wood frame with aluminum spacer.

Table 2 shows the savings per year per square foot of window area. (Energy costs are based on provincial average electricity prices).

Space heating energy savings of 9 to 18% can be gained by upgrading from standard to high-performance glazings. Savings in energy are greater in locations with colder heating seasons, but cost savings depend on energy costs as well as climate.

When a standard double-glazed window is up-graded to soft coat low-e glass a minimum energy savings of 9% is shown for all locations. These savings range from 1,490 kwh for a mild climate (Vancouver) to 2,780 kwh for a cold climate (Winnipeg). If the stan-

dard window were up-graded to a low-E plus argon unit, the energy savings range from 13.8% to 16.8%, resulting in savings of up to 4,200 kwh.

The data also show that standard triple glazed windows perform slightly better than the double-glazed, low-E, air-fill window in all locations, but are always beaten by a "super double" with low-E and argon.

Points to Consider

Consumers must make their own decisions if the incremental cost of high-performance windows is worth the energy savings. What is not factored into the calculations are the increased comfort and the reduction of UV bleaching of fabrics that is available with the improved glazing.

Although low-E coatings and gas fills can offer important improvement to centre glazing R-values, their full potential is not realized unless better spacers and frames are used. The value of the insulated spacer increases as the R-value of the centre glass increases.

Low-E coatings provide a thermal benefit at the cost of reduced solar transmission. However, both gas fills and insulating spacers improve the overall thermal performance of windows without affecting the solar transmittance. High-performance windows also reduce indoor air temperature swings.

Coming: Energy Labels for Windows

The increasing demand for better windows has created a need for a standardized method to evaluate and compare their performance. Household appliances have Energuide ratings. Cars have a mileage rating. There is nothing similar for windows.

A window energy labelling program is now being considered by the Canadian government.

The purpose is to create a "level playing field" that would allow buyers to compare the relative performance of different products by comparing their energy ratings. Energy labelling would be a useful tool for regulatory authorities to determine code compliance as well as for utilities in offering incentives for efficient products with the potential to reduce peak load demand. (Ontario Hydro is waiting for such a program before launching an incentive program.)

The single R-value number is too elementary because it does not include solar gains or air leakage, and so it does not allow buyers to sort out products with similar R-values but different shading coefficients or weatherstripping.

An energy balance calculation combining into one number the three major performance characteristics that are measured separately is seen as the most suitable evaluation procedure. The proposed formula is:

Energy Rating = Solar Gains - Conduction Heat Loss - Infiltration Heat Loss

A positive value means that the window is a net energy gainer. a negative value means the window is a net loser. A good window for a heating climate could have a positive number, or at least a small negative one. A good window for cooling climates would have a small positive number.

The labelling program is trying to establish a balance between testing and calculation for determining the right numbers. Four ways to calculate window R-values are being considered:

1) Test the window for each different product type and glazing option

2) Test each window type and then use a calculation to adjust for glazing options.

3) Use computer simulation to calculate all frame and glazing values

4) Calculate the energy rating using frame and glazing U-values as published in ASHRAE Handbook of Fundamentals.

Because of the large variety of window combinations, it is too expensive to test each unit and the fourth is not able to handle the wide variety of frame profiles available.

The Canadian Standards Association is studying the proposed window labelling idea, and will add an energy evaluation procedure to the CSA A440 Standard.

Testing Windows for Gas Fill

The use of inert gases (like Argon) in sealed low-e windows has become common. The energy saving by is substantial. However, there has not been any easy way to find out if a window really does have gas fill or if the correct mix has been used without physically destroying the seals unit.

The only surefire to determine it is to do a full scale lab tests which can be expensive so there is a need for a portable inexpensive test which can be used by the manufacturer for quality control, for long-term field-performance tests, and for quality assurance at the construction site.

At present, a window unit's seal is usually punctured, and a sample of the gas extracted for analysis in order to determine the gas fill level. The only measurement which does not interfere with the window unit is suitable for standards testing, but is costly. The need to isolate any vibration means it is not suitable for field tests or production line quality control.

Dr. Bryan Latta at Acadia University in Wolfville, Nova Scotia may have a promising new approach to measure the gas fill level of multi-glazed units.

The test involves using a calibrated meter and driving an electric current across the window. The electric discharge measurement is capable of very accurate measurements. However, before this method becomes ready for use in the field more detailed work is required, and more precise calibration curves for gas-air mixtures are needed.

A description of the work on this testing procedure was presented at the 16th Annual conference of the Solar Energy Society of Canada in Halifax last June. It will still be some time before an instrument using this type of testing procedure is available, but once ready it will ensure better quality control for windows.

Blow-In-Blanket Receives Canadian Approval

The Blow-In-Blanket System (BIBS) is a patented blown insulation system that combines standard loose fill insulation materials (fibreglass, rockwool, cellulose) with a latex adhesive binder to form a rigid blanket when dry.

The BIB System has recently received approval from the Canadian Construction Materials Centre CCMC #11790. The testing was done at the National Research Council of Canada and included tests to measure the density, R-value, moisture content and the effect of freezing conditions in the installation of the Blow-In-Blanket System.

The effect of freezing conditions on the binder of the BIB System during installation has been a concern in the past. To test the impact of freezing on the BIB system, samples were frozen at -20°C for several days. Examination of the fibres showed no difference between the frozen sample and other samples installed at room temperature.

Tests were also done to determine if freezing would have an effect on settling resistance; the material had little settlement. It seems that freezing has no effect on the performance of the binder used in the Blow-In-Blanket System (but the binder must not be allowed to freeze before installation).

The measured R-values of the BIB system ranged from R-3.4 to R 3.8 per inch, which were lower than those of previous tests performed in the U.S.A. (U.S. tests indicated R-values of R-3.8 to R-4.3 per inch).

Another concern with the BIB System is that the R-value may not be consistent unless density is uniformly controlled. Samples were extracted from each and measured for density and moisture content. The density results for both brands of fibreglass ranged from 1.5 lb/ft^3 to 2.5 lb/ft^3. According to the NRC's measurements, even the lowest density sample should have an R-value of about R-3.6 per inch which is consistent with R-value testing for the BIB system.

The NRC testing addressed the main issues have been the subject of controversy for the BIB System over the last several years. There has been some concern for the effect of freezing conditions on the binder used in installation, R-values, uniform density, and moisture content.

Quality control is maintained by the insistence that application is done only by certified installers.

For information:

In the U.S.A: Ark-Seal International, Inc., 2185 S. Jason, Denver, CO 08223; tel: (800) 525-8992 or (303) 934-7772.

In Canada: Bill Scherba, Near North Insulation, North Bay, Ont. tel: (705)-472-3030 or 1-800-825-8992.

Building Science Division at Saskatchewan Research Council

The Saskatchewan Research Council (SRC) has created a new Building Science Division to serve the construction and building industries in Saskatchewan and Canada. It was formed as a result of an agreement between SRC and the National Research Council of Canada. It will complement the activities of NRC's Institute for Research in Construction (IRC) in Ottawa.

Research staff from NRC's former Prairie Regional Station in Saskatoon became part of SRC on June 1, 1990. The NRC continues to maintain nine Construction Technology Advisors in the prairie provinces.

SRC's Building Science Division will launch a new radon in buildings research program. They plan to develop a national capability in the areas of radon measurement, assessment and control.

Radon is a naturally occurring element that is present in various concentrations in most soils. If the buildings are not adequately designed, and built, the radon levels can build up inside resulting in increased risk of lung cancer.

The new division will also undertake contract research work for a variety of user groups, including manufacturers, buildings and regulators.

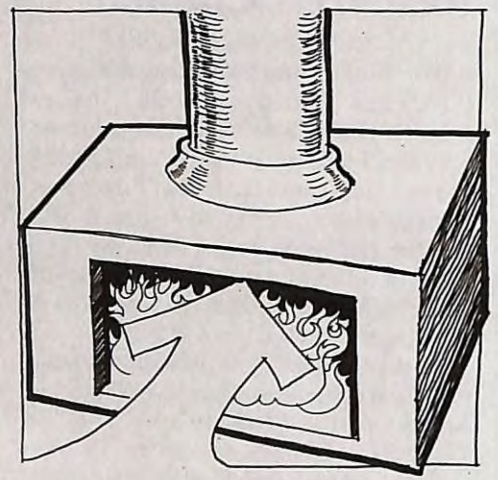
Saskatchewan Research Council
15 Innovation Blvd. Saskatoon, Sask. S7N 2X8
Tel: (306) 933-5400
Fax: (306) 933-7446

The Drawing-Room Graphic Services Ltd. Honored as Company of the Year

At the 1990 Annual conference of the Solar Energy Society of Canada in Halifax your editor was pleasantly surprised by the presentation of the Society's "Company of the Year" award.

The award was made in recognition of the continuing efforts to promote low energy building through the publication of SOLPLAN REVIEW. Our readers deserve credit also for their continuing interest and support.

Fireplace Air Requirements



Research has shown that excessive house depressurization can cause combustion products from fuel-burning appliances to spill indoors. Fireplaces (especially open masonry ones) can be major sources of air exhaust from houses, enough to depressurize the house.

Fireplaces themselves can be a source of indoor air pollution when house depressurization causes them to spill. A CMHC sponsored study done by ORTECH looked at how much air is needed by factory-built fireplaces, their pressure limits and air supply strategies, as well as to suggest ways to separate house and fireplace air. The work was done in the ORTECH International laboratories.

Problems with fireplaces

These include:

* spillage of flue gasses from the fireplace into the house; this can be a nuisance when smoke spills into the room, but harmful if carbon monoxide and other gases spill into the house when the fire dies out.
* spillage of flue products from other combustion appliances when the fireplace depressurizes the house;
* fires resulting from overheating of combustible materials adjacent to the fireplace or fireplace chimney;
* reverse flow of flue products through air intakes connected directly to the firebox.

In an 11' x 11' x 8' high test room five factory-built fireplaces were taken through test burns to determine how resistant they were to spillage under various room depressurizations, their chimney flow rates, and the flow rates in their fresh air intakes. Separate tests were done to determine the airtightness of the glass doors and fireboxes, and the flow characteristics of the air intakes and chimneys.

Table 1 describes the fireplaces tested.

The results show that most of the factory-built fireplaces tested would not act as major house exhausts nor would they be likely to spill under normal operation. Chimney flow rates were low when the fireplaces were operated with closed doors, but much higher when doors were opened.

Combustion air intakes proved to be of variable utility, supplying close to all required air in some fireplaces and less than 25% in others. Air intakes connected to the circulation air plenums were not very effective. Those connected directly to the firebox could match air requirements but could be dangerous in reverse flow (when combustion products flow out through the intended intake). The frequency of such reversals has yet to be established.

All fireplaces would spill during fire diedown if a room depressurization of roughly 10 Pascals was maintained. This amount of depressurization does not happen often although it can in a reasonably tight house with good exhaust fans.

Five fireplaces were chosen for testing to represent the range of units found on the market (specific makes or model numbers were not identified in the report).

For units A, B and C the outdoor air supplies terminated in the plenum where indoor air circulated to remove heat from the fireplace. Unit A had no connection between the circulation air plenum and the firebox.

Units B and C took combustion air from the circulation air plenum. Unit B had two fans that pressurized this plenum to a certain extent to assist in the flow of combustion air. The fans were controlled by a thermostat on the fireplace. As well, dampers allowed the unit to draw all of the circulation and combustion air either from outdoors, or from the room in which the fireplace was located.

Unit D had combustion air directly ducted to the firebox. Air for the circulation plenum comes exclusively from inside the house. Unit E had combustion air ducted through the firebox wall, behind the refractory liner.

TABLE 1: DESCRIPTION OF FIREPLACES TESTED

Unit	Relative Tightness of Firebox	Outdoor Air Supply	Supply Air Duct Size	Firechamber Lining	Other
A	Loose	Circulation plenum	4" diameter	Refractory	
B	Medium	Circulation plenum	3 ¼" x 10"	Metal	Fan forced circulation & combustion air
C	Tight	Circulation plenum	4" diameter	Refractory	
D	Very Tight	Firebox	4" diameter	Metal	
E	Loose	Firebox	4" diamter	Refractory	Air-cooled chimney

TABLE 2. FLOWS THROUGH FLUES AND COMBUSTION AIR DUCTS

Fireplace	Pressure required to induce spillage (pascals)		Chimney flue air flow rate		Combustion air duct air flow
	high burn	low burn	high burn	low burn	(@ -5 Pa)
A doors open	14	11	98	84	16
A doors closed	25	20	61	33	16
A doors taped	27	20	48	38	16
B outside air fan off	25	16	92	90	42
B outside air fan on	25	16	84	73	75
B room air fan off			75	63	15
C	25	16	65	21	15
D	24		75	10	6
E			147	105	2

To create a 5 pascal negative pressure in the test room required an air flow of 85 cfm.

Pressures to induce spillage

Spillage is more likely to occur when the draft is lowest, as happens at the beginning and end of the burn cycles.

With doors open, at high burn rates, spillage could be induced in Fireplace A at a room pressure of -14 Pa (-11 Pa with a low burn rate). With the doors closed these values changed to 25 and -20 Pa respectively. As with the other units tested, how tight the doors were had little effect on the pressure at which spillage occurred.

Fireplaces C and D had fixed baffles above the fire which forced the flue gases towards the front of the firebox before they entered the chimney. When the fire was lit, there was a tendency for smoke to roll out the front of the fireplace when the doors were open. In fireplaces B, C, and D if the fireplace doors were closed tightly right after lighting the fire, it would go out as there was not enough draft to draw in enough air to sustain the fire.

The draft required for operation with doors closed tightly depends on the equivalent leakage (flow) area (ELA) of the combustion air intake. The smaller the ELA, the greater the draft required to induce adequate combustion air.

The connection of the outdoor combustion air supply directly to the firebox (fireplace D) did little to prevent spillage during start-up. The fireplace still had to rely on room air for combustion until enough draft had been created to allow closing the doors, and intake of combustion air through the direct connection. Fireplace B did have a fan assisted air supply, but the fan did not operate until the fireplace warmed up.

During die-down of the fire, spillage began at a room pressure of -10 Pa, (fireplaces A, B and C) when the temperature in the flue dropped below about 100°C. Backdrafting took place when the room pressure was 3 Pa less than the pressure at the base of the flue.

The range of airflow rates up the chimney was in the order of 20 to 105 cfm. The high flow rate would depressurize the test room by about 5 Pa.

Table 2 summarizes the results. It shows the combustion air flow (at a house depressurization of 5 Pascals) through 4 inch diameter supply ducts is not enough. They provide some protection against excessive depressurization in a tight house, but to supply 40 cfm at a 5 Pa differential pressure combustion air inlets would have to be roughly 2-3 times larger to match the fireplace exhaust rate at low burn.

Small short fires might be more likely to spill during diedown as there is less storage of heat in the fireplace and chimney to maintain a draft during diedown.

The results show that the fireplaces tested were more resistant to spillage than had previously been expected. However, it is difficult to start a fire without spillage when the room is under negative pressure, or if there is airflow down the flue. But if the pressure is reduced (by opening a window) a draft can be quickly established.

Room depressurizations of -10 Pa did result in spillage from the fireplaces towards the end of the fire when coals were burning. This is a dangerous situation, as the combustion gases are high in carbon monoxide concentration, which is odourless and does not contain any smoke particles. An ionization smoke detector will respond to spillage during startup of a fire, but it can't respond to spillage during diedown of a fire.

The 4 inch combustion air duct connected directly to the firechamber can supply the total air requirements for a low burn fire, after a draft pressure of 15 to 20 Pa has been established, and if the firebox can be sealed tightly from the room. The major problem with this type of intake is the potential for reverse flow of hot gases through the air intake when a large negative pressure is applied to the air intake. This could occur in a strong wind if the intake were in a leeward area.

"Fireplace Air Requirements" prepared for CMHC by ORTECH International, Scanada Consultants and Sheltair Scientific.

Letter to the Editor

Sir,

In Solplan Review No. 33 (June/July 1990) there are some comments regarding CFC's and HCFC's that I feel were probably typed or quoted in error.

Refrigerants R-11 and R-12 are fully halogenated chlorofluorocarbons. Both of these are developed from the basic methane molecule where all of the hydrogen atoms in the molecule are removed and replaced with a halogen (chlorine or fluorine). They are widely used in the refrigeration and air conditioning industry with R-11 being one of the main refrigerants being used in large centrifugal refrigeration equipment used for building air conditioning and R-12 being one of the main refrigerants used in supermarket refrigeration, automotive air conditioning, etc.

In small residential and/or commercial building air conditioning systems the most commonly used refrigerant is R-22, which is an HCFC which is a chlorofluorocarbon refrigerant that still retains one of the hydrogen atoms in it (i.e. it is not fully halogenated). The ozone depleting potential of R-22 is about 5% of that of R-11 or R-12.

Currently work is underway to develop refrigerant R-134A as a replacement refrigerant for R-12. This refrigerant, however, is not a "drop-in" refrigerant as other changes will have to be made to the system to accommodate it, mainly pipe sizing, valve sizing and lubrication.

Work is also underway with the development of refrigerant R-123, which is an HCFC (hydrochlorofluorocarbon) that has only approximately 2% of the ozone depletion potential of R-11. This refrigerant has been identified as the most likely replacement for chillers now using R-11 because its thermodynamic properties are similar of those of R-11.

HCFC's are a good bridge to ozone safe industry practices. However, there is concern that although they have a much lower ozone-depleting potential there could be a rapid increase in the use of these refrigerants and the problem would still be of such proportion that other steps would have to be taken. Currently there is much research work being done trying to find replacement refrigerants that have zero ozone depleting potential and, hopefully, nearly a zero impact on the environment.

As you are no doubt aware this is going to be a long and laborious chore and there are no quick solutions. One of the real problems when any of the current crop of replacement refrigerants is considered is that there is going to be a increase in energy consumption using these refrigerants. The increase in energy consumption, although relatively small (2-5%), will still cause other problems with our environment and thus, as in most things, there will be no free ride but simply a matter of making choices in how we wish to live.

Personally I am quite concerned that our legislators may decide to ban certain refrigerants without fully realizing the consequences of their actions. There is no sense banning refrigerants if there are no suitable alternatives in place. Our Western world relies absolutely on the use of refrigeration to maintain our health and standard of living. Nearly everything we eat and all of the pharmaceuticals used in our health system require refrigeration some time during their distribution or production. We have to be careful or we will throw the baby out with the bath water.

Donald E. Holte, P.Eng.
Director, ASHRAE
Edmonton, Alta.

You raise some valid points. The transition to an environmentally friendly industrial society will require difficult choices be made. In the CFC debate, we hear the point you raise about finding safe alternative refrigerants for use in existing equipment and systems - in other words retrofit options.

We have not heard too much about what is being done in the development of new, environmentally safe alternatives for new applications. It seems to me that 2 parallel tracks of activity have to be pursued - one to look at the retrofit of existing systems - and this is what seems to be getting all the attention. The second is to take a fresh new look at new installations so that they don't have to be retrofitted in a few years when these options are available. Ed.

Gas Furnace Regulations: Ontario

Residential forced air gas furnaces up to and including 400,000 BTUH with standing pilots are illegal in Ontario after July 1, 1990 under new Regulations.

The July 1, 1990 date is based on manufacture NOT installation, so units made before that date can still be sold. Furnace manufacturers will be required to verify, by serial numbers, products manufactured after June 30, 1990.

All parties in the selling chain of a product are covered by the regulation and can be charged for contravention (including the manufacturer, distributor or contractor.)

This regulation applies to Ontario only so standing pilot furnaces can still be sold in the other provinces.

B.C. Energy Efficiency Act

Taking the lead from Ontario, and with an eye on the public desire for environmental action, the B.C. government has passed the Energy Efficiency Act.

The Act allows the government to set energy performance standards for new appliances, electric motors and other energy-using equipment as part of a full-scale program to improve energy efficiency in B.C.

Under the new legislation, selected new appliances and equipment will have to be labelled to show that they meet minimum energy efficiency standards (expected to be in place early in 1991) before they can be sold in British Columbia. National standards agencies like the Canadian Standards Association, industry and utilities will be consulted in the development of standards and testing procedures.

Appliances covered will include: refrigerator/freezers, electric water heaters, gas furnaces, electric clothes dryers, clothes washers, electric ranges dishwashers, heat pumps

The energy program will also include working with B.C.'s electric and gas utilities to develop programs to ensure that the full potential for energy efficiency is realized. A New Energy Code for Builders is also being developed.

Effectiveness of Air Sealing techniques.

Richard Kadulski

Air sealing or draft-proofing is important to reduce energy consumption as uncontrolled air leakage can account for well over 1/3 of a home's total heat loss. That is why air sealing is stressed in retrofit programs.

How tight is tight?

How do you know you're getting your money's worth? North East Utilities, a Connecticut based utility is typical of many that have started retrofit programs to assist residential customers in reducing their heating bills.

The Wrap-Up/Seal-Up (WUSU) program offers weatherization and conservation services at cost. The Wrap-up portion of the program addresses domestic hot water conservation; the Seal-up portion of the program is designed to save the heating and cooling energy costs by reducing infiltration. There are two approaches offered for air sealing, one is a low cost prescriptive approach (seal-up), the other is a more elaborate performance based approach (using the air sealing specialist).

To determine just how effective each approach is, they undertook a study of both approaches. The questions they tried to answer were:

* *How well does a basic prescriptive program reduce infiltration?*
* *Is the air-sealing specialist's approach a more effective way to reduce infiltration?*
* *Which method will save the homeowner the most money per dollar of investment?*
* *Will air-sealing a home increase its concentration of indoor air pollutants, particularly Radon?*

WUSU offers twelve energy conservation "measures". The customer selects the measures he feels are useful for his home.

The Wrap up program for domestic water conservation includes: a water heater insulation blanket; turning down water heater thermostat; low-flow shower heads; low-flow faucet aerators; wrap pipes with insulation; insulate forced-air ducts; put thermal coverings on basement windows

The Seal-up measures save energy by **reducing infiltration.** These include: caulking window and door frames; weatherstripping window and door frames; installing door sweeps to block air flow under doors; insulate the attic entrance hatchway, door or pull-down ladder; insulation gaskets behind electric switch and outlet cover-plates; insulate the gap between siding and foundation.

Air sealing approaches

Operation Wrap-up/Seal-up is a low-cost approach to weatherization; but its effectiveness is also low. Seal-up usually achieves small but measurable infiltration reductions, but sometimes no measurable reductions are achieved.

WUSU relies on the occupants of the house to identify the major points of infiltration in the structure. It is assumed that the homeowner will be aware of the areas to improve. It could be the winter wind blowing under the front door, or the drafty window next to the bed or easy chair. The infiltration control measures are selected by the occupants from a limited menu, and all measures (except sill plate sealing) are performed within the living space.

The alternative approach is using an "Air Sealing Specialist", who uses special tools to locate drafts and air leaks into the house. The specialist eliminates those air leaks with caulks, sealants and other materials. The work normally takes longer and is more expensive than that done by WUSU.

The air-sealing specialist's work is more expensive, but tests have shown that it is also very effective at reducing infiltration.

The Specialist uses a blower door (and possibly other specialized tools) to discover where air is leaking into the house. From experience he knows that the leakiest parts of a house are often hidden and the homeowner will not be aware of them. He looks for air leaks that are "buried" within the details of construction, often found mainly in attics and basements.

The method looks at the house as a whole system, and searches for both infiltration and conduction losses. An infrared camera to scan walls and ceilings may be used to look for missing insulation and places where cold air is flowing through hidden paths.

A Quick Seal Approach assumes that the typical house has a few major leaks which account for more than half of its leakage. The Quick Seal Approach aims to locate and plug these leaks in a short period of time (typically a half-day visit by a two-person crew) and achieve substantial energy savings at about half the cost of a more comprehensive house doctoring job.

The test

100 single family detached homes were studied, 50 were treated using the basic seal up techniques, 50 used the specialist techniques.

The basic seal up group was further subdivided: Group 1 received only the specific measures requested by the homeowner; Group 2 received every WUSU measure that could be done to the house. Every window and door was caulked and weatherstripped. A sweep was installed on every exterior door. The foundation sill was sealed when it was accessible. Outlet gaskets were installed on exterior walls. This was to determine the maximum savings to be gained.

Group 3 consisted of the 50 homes treated by the Specialist.

Airtightness Before:

Before retrofit, the average infiltration rate was 11.4 to 13.5 ACH at a pressure difference of 50 Pascals. (The R-2000 standard is 1.5 ACH at 50 Pascals).

The homes with electric heating were found to have a 38% lower leakage rate than those with gas heating. (Part, but not all, of the difference is likely due to the presence of a flue.) Houses with ductwork had 15% more leakage than those without.

Airtightness After:

After the retrofit work, the air leakage rate was reduced by: 3.9% for the Group 1 houses (owner requested items only); 10% for Group 2 houses (maximum prescriptive items); and 23% for Group 3 houses (the specialists' work).

Cost:

The average WUSU participant in this test requested $25 worth of measures. The effectiveness of the measures varied considerably; some were effective and others did not show any infiltration reduction. Attic ladder covers were ineffective at reducing infiltration (but they appear to be effective as insulation, and could reduce infiltration with some design changes). Sill seal was found not to be effective in the three homes where it was tested.

Installing all possible WUSU measures in a house had a greater effect reducing infiltration. If the homeowner had paid for this work, he would have paid, on average, $230. (costs ranged from $53 to $408 per site).

While the savings achieved by the WUSU work are low (averaging $22/-house), the payback to the homeowner is quick. Spending nine times as much yielded a 3-times increase in leakage reduction. Doing intensive WUSU appears to have a diminishing return. When "maximum WUSU" work is done a lot of it will be ineffective.

The Air-Sealing Specialist's work was, as expected, the most effective method for reducing infiltration (by an average 23%). Significant differences were found in the degree of reduction that could be achieved in gas heated vs. electrically heated houses (the electric houses were tightened more).

As the electric houses in the test were older it was difficult to determine if the Air-Sealing can tighten the typical electrically heated house more than it could the gas heated house.

The Specialist's tools and measurement techniques enabled him to locate many previously unknown leaks in the houses. Many infiltration points were located and sealed, most of which could not be treated using the tools available to WUSU crews.

The cost of the Specialist's work in a full-scale program is ill-defined as standard specifications have not been established. If one assumes that the Specialist's work were to cost about $300 to $400 per house, it would be 12 to 16 times as expensive to the customer as the basic work done in this test. Infiltration is reduced by 7 to 8 times as much as was done with the simpler approach, so the specialists' work is about 7 times as expensive but has the same payback rate.

The Air-Sealing work done in this test was performed by trained crews, much done within the living space, less in attics and basements. (Some firms claim that 90% of their tightening work is done in attics and basements). More training (possibly with other tools such as an infrared camera) might increase the effectiveness, yielding up to a 30 to 40% infiltration reduction as a practical upper limit.

If the lifetime of the sealing work is more than ten years, all approaches tested here were shown to be worthwhile.

Air Quality Measurements

Three pollutants were measured in each home before and after sealing: Radon, formaldehyde and nitrogen dioxide (NO_2). In all houses and for all three pollutants, nearly as many houses showed a decrease in pollutant concentration as showed an increase after sealing.

Air quality measurements indicated that sealing a home does not cause a decrease in its indoor air quality.

"A comparison of Two Weatherization Techniques: NU Seal-up vs The Air Sealing Specialist". Study Conducted by Enercom Inc. Marketing Services Department, North East Utilities, Hartford CT.

No. BS Centre

There are strange things done in the midnight sun
By the men who moil for gold;
The Arctic trails have their secret tales
That would make your blood cold;
The Northern Lights have seen queer sights,
But the queerest they ever did see ......

On September 22, 1990 in Whitehorse, Yukon, far away in the northwestern corner of Canada the Northern Building Science Centre (the No BS Centre) is officially opening.

Guests from other arctic regions in the USSR, USA and Finland, and even Ottawa, are expected for the opening.

The north faces some of the harshest climate conditions in the world. This means that special design and construction practices must be taken into account to deal with northern realities.

Up to now there has been no focal point to deal with northern building issues. Most activity has been coordinated from the South at the NRC in Ottawa and the former Prairie regional station in Saskatoon.

This is about to change as the Northern Building Science Centre located on the campus of the Yukon College opens. It will facilitate building trades training programs, be an information source to the industry and public as well, and help coordinate research and development into northern building issues.

The centre was initiated by northerners themselves. Wayne Sippola, the R-2000 program manager for the Yukon and Yukon Homebuilder's Association executive officer has been a key driving force for the project. It will also house the Yukon Home Builder's Association.

The structure itself is innovative: It uses a rigid monocoque frame developed by the Council of Forest Industries of B.C. The frame is supported on 4 footings rather than a perimeter foundation wall. This allows for foundation movement without damaging the building - an important consideration for buildings built on permafrost.

The structure is "stick built" and uses spruce plywood, spruce dimension lumber, 20 gauge galvanized sheet steel and a large number of power driven nails.

Residential Ventilation:
How to comply with 1990 Building Code Requirements

The revised 1990 Building Code has requirements for mechanical ventilation. How to comply with the Code?

An overview of the requirements and examples of systems that comply are the subject of a new document that tries to provide how-to information. A preliminary draft, to seek feedback from all sides of the housing industry, is now available for review.

The new Code requirements are not to be considered the last word in residential ventilation. Rather, they should be considered to be minimum requirements.

The How-To manual

The manual is divided into several sections. The most important outline the code requirements and provide seven basic example systems which either meet or exceed the code. These have been grouped by heating system type: forced-air systems and systems without air circulation.

As well, some information on ventilation system components and design and installation options which affect the systems are outlined.

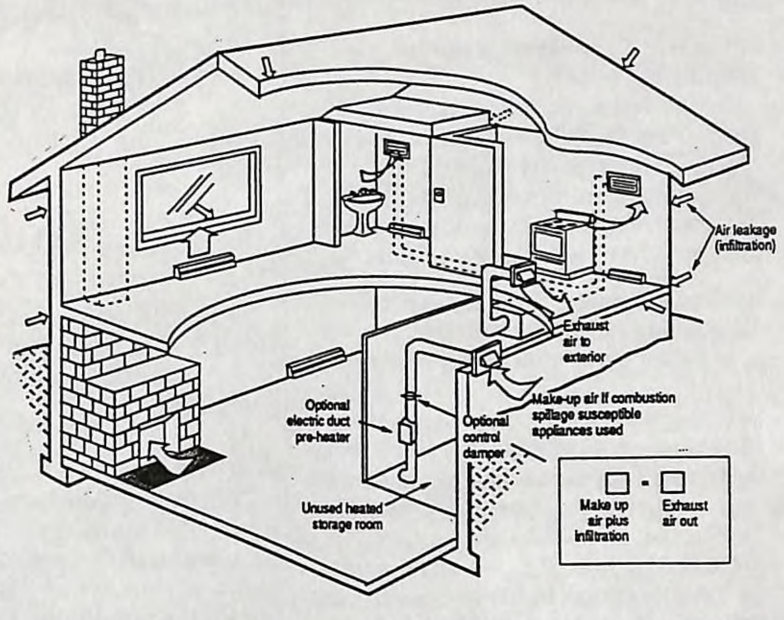
System evaluation should be done with regard to both performance and cost. One cheap to install but that results in homeowner complaints or performance problems is false economy. When selecting a system, the builder needs to consider cost, efficiency, marketability and long term performance as well as the technical aspects of the systems.

There is a lot of usefull information provided about system components and layouts. However, after discussing the principles and options available, the manual does not provide any assistance to the reader how to select an appropriate system for a specific application. A flow chart or map to guide the decision making process can be drawn up, and would be helpful.

Code requirements

The 1990 National Building Code calls for a mechanical ventilation system capable of exchanging the air in a dwelling with outdoor air at a rate of 0.3 air changes per hour (ACH) averaged over a 24 hour period. The calculation is based on the entire heated volume of the house, including basement.

The kind of ventilation system is left open. It may be an exhaust-only, a supply-only, or a combination supply-and-exhaust system. A fan for each bathroom is not needed, nor are there any specific criteria for electrically heated houses.



Central exhaust ventilation system for radiant & hydronic heating systems

A continuously operating ventilation system is not required; it can be run by either a manual switch, timer, or an automatic switch such as a humidistat.

Fan Selection and Sizing

Fans must be rated at least at 25 Pa. to take into account duct resistance, (50 Pa if there are long duct lengths). Quiet fans are recommended (2.0 sones or less). Dryers, central vacuums, cook-top stove exhaust fans are not included when calculating required exhaust capacity.

Make-up Air Ducts

Where exhaust fans are used in houses that have spillage prone combustion appliances (naturally aspirating gas appliances, oil-fired appliances with barometric dampers, all wood burning appliances and fireplaces), a properly sized duct or hole must be included to provide make-up air.

Combustion Air Inlets

Combustion air inlets for fuel-fired appliances are not to supply make-up air requirements unless the inlets have enough capacity to serve both functions simultaneously.

Complying with the code

Seven ventilation systems which meet or exceed the 1990 Code are described. Each has a schematic diagram, commentary on advantages and disadvantages, installation features, sizing charts and schematic specifications. Four apply to Forced-Air Heating Systems; three to houses heated with electric or hydronic baseboards or Radiant Heating Systems.

1. Point Exhaust Ventilation Systems

This basic system requires the least change from current practice. One or more exhaust fans are required (usually in the kitchen and bathrooms) with a combined capacity to meet the ventilation requirements of the house.

Cost: $300-700. Depends on complexity of ducts and number of fans used.

2. Central Supply with Forced Air Heating

The furnace is used to distribute fresh air through the house. Outside air is ducted to the return air plenum of the furnace where it mixes with indoor air and is distributed to rooms

serviced by the furnace. This system can create positive pressures which may drive humid air into walls and attics causing moisture problems.

Cost: $150-500 depending on complexity of ducting, controls and heaters.

3. Central Exhaust with Forced-Air Heating Systems

Several pick-up points (usually kitchen and bathrooms) connected to a fan with the capacity to meet the ventilation requirements of the house.

Cost: $500-1500. Depends on complexity of ducts and number of fans.

4. Heat Recovery Ventilators with Forced Air Heating

Heat recovery ventilators can assure high levels of indoor air quality while reducing the energy costs associated with heating ventilation air. The fresh air is supplied to the forced-air heating system so that the furnace ducting distributes air to the living space.

Cost: $1,000 to 2,500 depending on complexity of exhaust ducting and size and type of central ventilators.

5. Point Exhaust with Radiant or Hydronic Heating Systems

One or more exhaust fans (usually in the kitchen and bathrooms) with a combined capacity meeting the ventilation requirements of the house.

Cost: $300-700. Depends on complexity of ducts and number of fans used.

6. Central Exhaust Systems Radiant or Hydronic Heating Systems

Several pick-up points (usually in the kitchen and bathrooms) are linked to a fan sized to meet the ventilation requirements of the house.

Cost: $500-1,500. Depends on complexity of ducts and number of fans.

7. Heat Recovery Ventilators with Radiant or Hydronic Heating

Balanced flow systems that reduce the energy costs associated with heating ventilation air. The fresh air is ducted to distribute fresh air to the living area.

"How to comply with Residential Ventilation Requirements of the 1990 National Building Code"
prepared by Buchan Lawton Parent and Renewable Energy in Canada for CMHC, Ontario New Home Warranty Program and Ontario Ministry of Housing. Preliminary draft copies are available for review and comment from
Robin Sinha, Project Implementation Division, CMHC, Ottawa, ON
Tel: (613) 748-2660

Canadian Home Builders' Association

TRC News

The TRC agenda remains full, dealing with issues and problems of concern to the home building community.

Ventilation Task Force

To avoid duplication of effort, to review work and regulations in force or completed, keeping the builder's point of view, a task force group was established under the Codes and Standards subcommittee. The task force will be presenting a report at the November TRC meeting.

Residential Ventilation How-To Ventilation Manual

In the last issue we reported on a how-to manual that was being prepared as a joint venture between the Ontario New Home Warranty Program, the Ontario Ministry of Housing and CMHC. **How To Comply with Residential Ventilation Requirements of the 1990 National Building Code**, a draft of the manual is now available for industry comment. A review of the preliminary is presented in this issue of SOLPLAN REVIEW.

Building Code Changes

The 1990 edition of the Code is out, and should be implemented by the provinces within the next few months. There a number of changes being implemented that will have consequences on the industry. Builders should familiarize themselves with these, in order that the changes don't come as a total surprise.

In those provinces with a formal review process, there may still be some opportunity for input on the local level if the changes seem too onerous.

Building Code Seminars

The NRC will be holding code seminars this fall and winter.

The 1990 Code Seminar Series will review the new and revised requirements in the 1990 code and evaluate their effect on building design and construction.

All Parts of the NBC will be covered, but major changes to Parts 3 and 9 will be emphasized, outlining the background, intent and implications of amendments to these Parts.

Saskatoon	Sept. 17, 1990
Yellowknife	Sept. 19, 1990
Winnipeg	Sept. 21, 1990
St. John's	Oct. 15, 1990
Halifax	Oct. 17, 1990
Fredericton	Oct. 19, 1990
Montreal	*Mar. 19, 1991**
Quebec	*Mar. 21, 1991**
Vancouver	Apr. 16, 1991
Whitehorse	Apr.18, 1991

* *en francais*

For information, contact
(Mrs.) Chau Truong, IRC
National Research Council Canada
Ottawa, Canada, K1A 0R6
Tel: (613) 993-0065
Fax: (613) 952-4040

Builder Workshops

CMHC/CHBA Workshops for builders and renovators will continue this fall and winter. In order to assist in making these as useful as possible, be sure to contact your local association as soon as possible and let them know what kinds of seminars and workshops you are most interested in. They will pass on the information to the TRC to help in the design of the sessions.

Sprinkler kit

As we reported last issue, a resource package on sprinklers is being developed. This has information on cost effectiveness, technical and economic concerns. A resource package containing technical reports is now available from the TRC. A summary package is being developed by CMHC and CHBA. A draft will be presented to the TRC at its November meeting.

Library

Need information? Trying to find out why mushrooms are growing in the attic? What causes those crazy spots on the wall? Looking for a solution to a problem no one in your area can answer?

Did you know that a number of provincial Technical Committees maintain small libraries of information that just may have the answer? If not, then the TRC may have it, or will know who does. All it takes is a call to your local CHBA association. They will put you in touch with the right person.

Videos Too!

No, we're not talking about the latest hot movie. There are many videos out there that can help you deal with new construction products or techniques, or to improve your skills. Often, a video can tell the story much better and quicker than a book or magazine. Contact you local association to see what is available locally or from the Provincial and National libraries (if they don't have them on hand, they will have a catalogue).

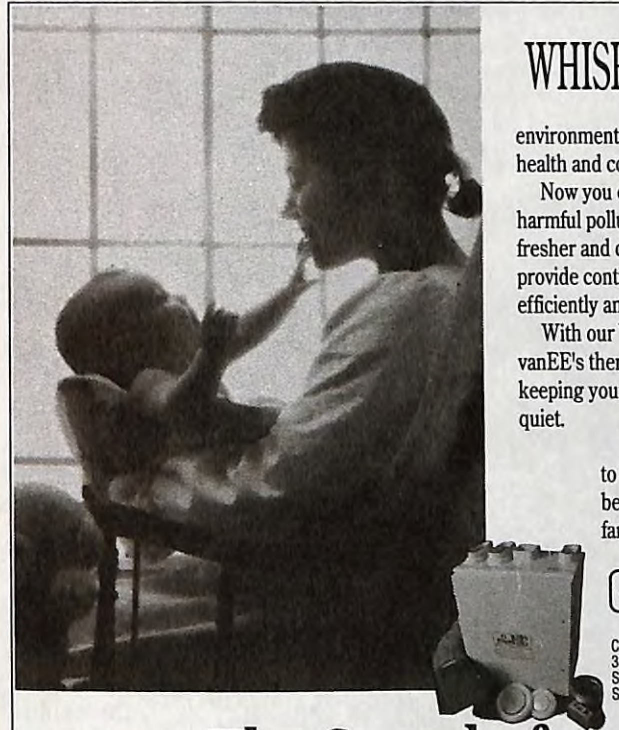
You can use the video as part of an in house training, wether you work in a large company or on your own.

Help Wanted

The TRC is there to serve the needs of the building community. To this end a two way communications is important. This means that your input is meaningful. If you have encountered unusual problems, let TRC know, because you may not be the only one with the difficulty.

You will shortly be asked to answer the fall CHBA - PULSE survey. Please be sure to complete it. Your answers count, even if you haven't encountered the problem, don't use the products, or whatever. The focus for the fall Pulse survey is on environmental attitudes and concerns. The results will be important in helping CHBA formulate a position in this area for the housing industry.

To contact the TRC:
Canadian Home Builders Association
200 Elgin St., Suite 502
Ottawa, ON K2P 1L5
Tel: (613) 230-3060



WHISPER

Your home's indoor environment is an important part of your family's health and comfort.

Now you can control humidity, odors and harmful pollutants and keep your home's air fresher and cleaner. vanEE Ventilation Systems provide continuous, whole house ventilation - efficiently and quietly.

With our VARIquiet™ design,you'll forget your vanEE's there, even when it's working its hardest keeping your air fresh and clean. It's 'whisper' quiet.

A vanEE Ventilation System, tailored to your home and lifestyle, is one of the best investments you can make for your family's health and comfort.

vanEE

ATMOSPHERE IN MOTION 1980-1990

CANADA
3310 Millar Avenue
Saskatoon, Sask.
S7K 7G9

TEL: 306-242-3663
TOLL FREE (U.S.):
1-800-667-3717
FAX: 306-242-3484

The Sound of a vanEE Whole House Ventilation System Hard at Work.

HOT 2000

WHAT IS IT?

HOT2000 is an advanced approach to the design and modelling of energy efficient structures.

HOT2000 is an easy-to-use computer program designed to assist builders, architects and engineers design low-rise residential buildings. Utilizing current heat loss/gain and system performance models, the program aids in the simulation and design of buildings for thermal effectiveness, passive solar heating and the operation and performance of heating and cooling systems.

WHAT CAN IT DO FOR ME?

HOT2000 lets you input comprehensive data on proposed building design, analyze the expected heat loss/gain, and revise and test altered designed until a satisfactory design is achieved.

Contains extensive weather data, several models for HRV, foundation, water heating systems, and more.

HOW TO GET HOT2000

HOT2000 is available from the Canadian Home Builders Association (CHBA) in either a Canadian or U.S. version at the following prices:

- $120.00 (Cdn) for the Canadian version
- $150.00 (US) for the USA Version (contains US weather data)
- Price includes User and Reference Manuals

To order HOT2000, complete the attached form and send it with a cheque or money order to:

HOT2000 Sales
CHBA
Suite 702, 200 Elgin St.
Ottawa, Ont. K2P 1L5
Tel: (613) 230-3060

ORDER FORM

Please send me
_____ copies of HOT2000 Canadian Version ($120.00 Cdn) per copy
_____ copies of HOT2000 USA Version ($150.00 US) per copy
IBM Mac

My cheque money order in the amount of _____ is enclosed. Make cheque Payable to Canadian Home Builders' Association

Name _______________

Organization _______________

Street Address _______________

City, Prov/state _______________

Postal/Zip code _______________

Telephone No. _______________

Small Buildings: Technology in Transition

This year's Building Science Insight seminar highlights current issues and recent technical developments in fire safety, building envelopes, ventilation, and noise control. It will be of interest to anyone involved in the design, construction, operation or regulation of small buildings.

St John's	Sept. 17	Moncton	Sept. 19	Halifax	Sept. 21
Ottawa	Sept. 26	Toronto	Oct. 9, 10, 11	Montreal	Oct. 17
Edmonton	Oct. 22	Calgary	Nov. 5	Saskatoon	Nov. 7
Vancouver	Oct. 24	Whitehorse	Oct. 26	Winnipeg	Nov. 9

Advance Registration $245.00; Students $70.00

Information: Institute for Research in Construction; National Research Council Canada, Montreal Road Ottawa, ON K1A 0R6

Tel: (613) 993-2607 Fax: (613) 954-5984

albo is here

Call now!
(604) 433-5697

ENEREADY

READY BY LATE FALL

THE NEW AIRCARE™

RESIDENTIAL VENTILATION PRODUCT LINE

- Central Exhaust Ventilators (CEV's).
- Swedish through-wall Draft Free Fresh Air Inlets with filters.
- Italian through-wall and through-window Low Noise Exhaust Fans.
- Heat Recovery Ventilators (HRV's).

OUR INNOVATIVE FEATURES WILL RESULT IN LOW TO MEDIUM INSTALLED COST, CONTINUOUS DISTRIBUTED VENTILATION SYSTEMS.

The benefit: "AFFORDABLE INDOOR AIR QUALITY"

If you have projects needing product by December, please contact us for more details. Specialist Ventilation Dealer enquiries also invited.

ENVIROSCIENCE PRODUCTS LTD.
1962 West Broadway, Vancouver, B.C. V6J 1Z2
Phone (604) 734-4211 Fax (604) 734-0520

SUBSCRIBE TODAY!

SOLPLAN REVIEW is an independent Canadian newsletter published 6 times per year to provide news, technical details, new product information, insights and commentary on developments covering all aspects of building science and energy efficient building practice for new and retrofit residential construction.
SOLPLAN REVIEW serves the needs of professional and interested lay persons. Technical information is presented in a clear, concise manner, without resorting to jargon.

YES, I WANT TO SUBSCRIBE TO SOLPLAN REVIEW

ONLY $ 30.00 per year
(u.s.a. and other foreign pay in u.s. funds).

payment enclosed please bill us P.O. # ____________

please charge to credit card:
VISA MASTERCARD AMERICAN EXPRESS

card number: ________________________ expiry date: ______

signature: ________________________

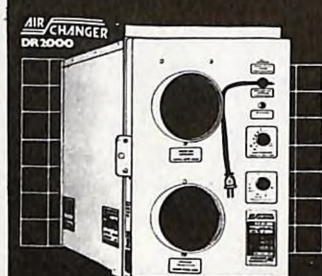
name: ________________________

address: ________________________

________________________ post code: ____________

the drawing-room graphic services ltd.
box 86627 north vancouver b.c. V7L 4L2

AIR CHANGER®



THE ENERGY EFFICIENT FRESH AIR SYSTEM™

- *High energy recovery (efficiency)**
- *High temperature recovery (effectiveness)**
- *Widest range of airflows, efficiencies, control options to suit your home's individual requirements*
- *Energy efficient electronic demand defrost system*
- *High quality modular construction features double shell case and heavy duty ventilation section*
- *Easy-access panels for service from either side without core removal*

* *According to independent lab testing to CSA standard C439M*
For further information call or write:

PRESTON BROCK

PRESTON-BROCK MFG. CO. LTD.
1297 Industrial Rd. Cambridge, Ont. N3H 4T8
Tel: (519) 653-7129 Fax: (519) 653-4781